

### **DETAILED ACTION**

The instant application is the national stage entry of PCT/EP03/02910, filed 20 Mar 2003; and claims benefit of foreign priority document EPO 02425172.0, filed 20 Mar 2002.

Claims 1-8 and 10-14 are pending.

Applicant's amendment, filed 21 Nov 2007, with respect to the objections regarding minor informalities in the abstract have been fully considered and found to be persuasive to remove the objection as the amendment addresses the issues raised in this objection. Therefore this objection is withdrawn.

Applicant's amendment, filed 21 Nov 2007, with respect to the objections regarding minor informalities in the specification have been fully considered and found to be persuasive to remove the objection as the amendment addresses the issues raised in this objection. Therefore this objection is withdrawn.

Applicant's amendment, filed 21 Nov 2007, with respect to the rejection of instant claims 4-6 under 35 USC 112 2<sup>nd</sup> paragraph have been fully considered and found to be persuasive to remove the rejection as the amendment to claim 4 addresses the issues raised in this rejection. Therefore this rejection is withdrawn.

The following rejections of record in the previous action are maintained:

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-5, 10, 11, and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Ward et al. (Surface Science, 1978, p257-273, cited in PTO-892).

Ward et al. disclose the use of cold plasma to generate free radical active centers within the cellulose matrix of cotton cellulose in the form of fibers in cotton print cloth. See Ward et al., page 258, lines 2-5, 14, and 25. This is the formation of a free radical on a polysaccharide chain that is cellulose in the form of a fiber used together with one or more natural cotton cellulose fibers. Ward et al. further disclose the radicals can react absent the radical source, "polymerizations can be initiated either by the simultaneous presence of monomer and cotton fabric in the plasma, or by direct contact between previously activated cotton and monomers." Ward et al. disclose the reaction between styrene, a functionalized olefin, and cellulose, and the product formed thereof. See Ward et al., page 271, lines 3, 4, 6, 7, and 18 and table 9, entry 3. Ward et al. further disclose that the stable radical has a half-life of about 1 day, "the singlet remains even after 24 h exposure to room atmosphere, showing that the radical is long-lived." See Ward et al., page 266, lines 6-9.

Response to Argument: Applicant's argument, filed 21 Nov 2007, with respect to the above ground of rejection, has been fully considered and not found to be persuasive

to remove the rejection. Applicant argues that "Exploratory investigations [into the use of activated cotton to initiate polymerizations outside the reactor] have met with limited success" (page 271), which is an elegant way to say that the experiments were a failure. Thus, in our view, the document not only does not disclose the process of the present invention, but even teaches away, since it reveals that attempts to react radicals absent the radical source were unsuccessful.'

Examiner finds that Ward et al. would recognize the difference between "limited success" and "unsuccessful", and that "limited success" signifies a success that was not attaining the highest goals or achievement. The disclosure of Ward et al. that "Exploratory investigations into the use of activated cotton to initiate polymerizations outside the reactor have met with limited success" (page 271) does not disclose the investigations were unsuccessful as Applicant argues. Further, arguments that the alleged anticipatory prior art is nonanalogous or disparaging art that teaches away from the invention are not germane to a rejection under section 102. See MPEP 2131.05.

Therefore the rejection is deemed proper and made **FINAL**.

Claims 1-5 and 11-14 are rejected under 35 U.S.C. 102(b) as being anticipated by Zara et al. (Tappi Journal, 1995, p131-134, cited in PTO-892).

Zara et al. disclose pulp cellulose fiber forms free radicals generated  $\text{Fe}^{2+}/\text{H}_2\text{O}_2$ , Fenton's reagent, which is followed by the addition of vinyl acetate, a functionalized olefin. See Zara et al., page 131, left column, lines 20-23 and middle column, lines 13-18 and page 134, middle column, lines 31-33 and 39-41. Zara et al. disclose the

grafting of cellulose pulp used in the paper industry, wherein the cellulose pulp fibers are used together with other cellulose pulp fibers to make paper. See Zara et al., page 131, middle column, lines 3-6. The radical is formed by consumption of the  $\text{Fe}^{2+}/\text{H}_2\text{O}_2$  reagent that is the radical initiator, to "create active centers by abstracting an active hydrogen from the backbone polymer chain" which may be propagated by growing poly(vinyl)acetate radicals, such that the propagated free-radical reaction occurs in the absence of the consumed  $\text{Fe}^{2+}/\text{H}_2\text{O}_2$  radical source. See Zara et al., page 133, left column, lines 5-10 and center column, lines 4-7. Zara et al. further disclose the cellulose graft polymer produced by these methods at different amounts of monomer grafted onto the cellulose backbone as data points plotted on graphs. See, for example, Zara et al., page 132, figures 1, 2, 3, and 4. The G% along the vertical axis of the graphs in the figures is calculated by the formula on page 134 right column, lines 4-9,  $\text{G\%} = [(M2-M1)]/M1 * 100\%$ , where M2 is the mass of the graft polymer product and M1 is the mass of cellulose. A G% of 100 corresponds to a ratio mol olefin/eq anhydrous glucose of approximately 1. Data points corresponding with individual polymers with this G% value are present in figures 2, 3 and 4, anticipating the range of ratios mol olefin/eq anhydrous glucose in the instant application.

Response to Argument: Applicant's argument, filed 21 Nov 2007, with respect to the above ground of rejection, has been fully considered and not found to be persuasive to remove the rejection. Applicant argues that Zara et al. does not disclose a separate production of radicals and polymerization step. However, the method of instant claim 1 recites "comprising: a first step, wherein a free radical on a polysaccharide chain is

formed, and a second step, wherein said radical reacts with an olefin in the absence of a radical source". Claim 1 does not recite a separate production of radicals and polymerization step, but a second step in which the radical reacts with an olefin in the absence of a radical source. It is well-known in the art that radical reactions occur via a free radical chain reaction, comprising 1) a initiation step wherein a radical source is consumed to produce a radical, 2) a propagation step wherein radical species different from the radical source react to produce other radicals, and 3) a termination step wherein free radicals are quenched with other free radicals. Zara et al. discloses the chain of reactions in which the free radical source is consumed to create free radicals that propagate the radical reaction and terminates in the reaction of a free radical on a polysaccharide chain with an olefin. See Zara et al. spanning page 132, right column, lines 6-17 and page 133, left column, lines 1-14. The free radical source is the initiator for the free radical chain reaction. A claimed embodiment of a radical source, disclosed in claim 3, is Fenton's Reagent,  $\text{Fe}^{2+}/\text{H}_2\text{O}_2$ . The radical source disclosed by Zara et al.,  $\text{Fe}^{2+}/\text{H}_2\text{O}_2$ , is consumed in the initiation reaction and is no longer present in these propagation reactions. Zara et al. discloses the reaction is run for 50 minutes (page 134, right column, lines 1-3) and discloses no radical source,  $\text{Fe}^{2+}/\text{H}_2\text{O}_2$ , remains that would need to be neutralized during isolation of the product. Therefore the reaction disclosed by Zara et al. comprises a first step, wherein a free radical on a polysaccharide chain is formed, and a second step, wherein said radical reacts with an olefin in the absence of a radical source.

Therefore the rejection is deemed proper and made **FINAL**.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-4 and 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Burke, N. and Guillet, J. (Canadian Patent CA 2,249,955, cited in PTO-892) in view of Krässig (Sven Papperstidn, 1971, p417-428, cited in PTO-892)

Burke, N. and Guillet, J. disclose the formation of carbon-centered free radicals on a polymer, attaching stable free radicals to the free radical sites and effecting controlled graft polymerization at the sites of attachment, absent the source of the radicals that generated the original free radical sites. See Burke, N. and Guillet, J.,

page 8, lines 19-22 and 24-32. The free radicals are generated on the backbone polymer and may be generated radiochemically using gamma rays from a cobalt-60 source or chemically using Fenton's reagent. See Burke, N. and Guillet, J., page 6, lines 10-11, 18, and 24-26. The graftable monomers that functionalize the polymer are functionalized olefins, for example acrylic acid disclosed on Burke, N. and Guillet, J., page 8, lines 12-14. In one embodiment the polymer samples are exposed to 2 Mrads of gamma rays from a  $^{60}\text{Co}$  source, a dose equivalent to 20 kGy. See Burke, N. and Guillet, J., page 13, line 33-34.

Burke, N. and Guillet, J. disclose a list of polymers for use with this method including the carbohydrate polymer cellulose. See page 6, line 1. However, Burke, N. and Guillet, J. do not specifically disclose this invention practiced with this polymer. It would have been obvious experimentation to one of ordinary skilled in the art to practice this invention with this polymer.

Burke, N. and Guillet, J. disclose free radicals generated radiochemically using gamma rays from a cobalt-60 source. Krässig et al. teaches "high energy radiation, such as gamma rays from radioactive isotopes as from Co-60 or others, or as highly accelerated electrons from industrially build accelerators, are able to create excited site in organic compounds, which in interactions, not known so far in details, can lead to radical sites". See Krässig, page 419, right column, lines 46-50 and page 420, left column, lines 1-2. It would have been obvious to try to one of ordinary skilled in the art to practice the invention of Burke, N. and Guillet, J. with "highly accelerated electrons",

or an electron beam, as the radiochemical source in place of gamma rays from Co-60 to give a dose of 2 Mrads with a reasonable expectation of success.

Response to Argument: Applicant's argument, filed 21 Nov 2007, with respect to the above ground of rejection, has been fully considered and not found to be persuasive to remove the rejection.

Applicant argues that Burke, N. and Guillet, J. differs from the present application in that 1) the polymers are irradiated in the presence of a compound that reacts with the generated free radical and 2) the type of the polymer.

As cited in the rejection, 1) Burke, N. and Guillet, J. disclose the formation of carbon-centered free radicals on a polymer, attaching stable free radicals to the free radical sites and effecting controlled graft polymerization at the sites of attachment, absent the source of the radicals that generated the original free radical sites. See Burke, N. and Guillet, J., page 8, lines 19-22 and 24-32 and 2) Burke, N. and Guillet, J. disclose a list of polymers envisioned for use with this method includes the carbohydrate polymer cellulose, a polysaccharide. See page 6, line 1. Nonpreferred and alternate embodiments constitute prior art. See MPEP 2121.

Applicant argues that Kraessig mentions the use of radiation for creating free radicals on the polysaccharides, but discourages one from using this source.

Kraessig is relied upon to teach "high energy radiation, such as gamma rays from radioactive isotopes as from Co-60 or others, or as highly accelerated electrons from industrially build accelerators, are able to create excited site in organic compounds, which in interactions, not known so far in details, can lead to radical sites" as functional



equivalent sources of radiation for creating free radicals. See Kraessig, page 419, right column, lines 46-50 and page 420, left column, lines 1-2. Kraessig does not specify that different sources of radiation for creating free radicals do not cause the "undesirable side effects." (page 420, first col., first paragraph) Therefore Kraessig does not discourage one from substituting different functionally equivalent sources of radiation known in the prior art. Burke, N. and Guillet, J. discloses an enabled embodiment in which the polymer samples are exposed to 2 Mrads of gamma rays from a  $^{60}\text{Co}$  source, a dose equivalent to 20 kGy. See Burke, N. and Guillet, J., page 13, line 33-34. It would have been obvious to one of ordinary skill in the art at the time of the invention to practice the enabled invention of Burke, N. and Guillet, J. using a functionally equivalent source of radiation for creating free radicals as taught by Kraessig.

Therefore Burke, N. and Guillet, J. in view of Kraessig renders claims 1-4 and 7-8 unpatentable.

The rejection is deemed proper and made **FINAL**.

Claims 1 and 4-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ward et al. (Surface Science, 1978, p257-273, cited in PTO-892) in view of Demott (US patent 3,558,596).

Ward et al. disclose the use of cold plasma to generate free radical active centers within the cellulose matrix of cotton cellulose in the form of fibers in cotton print cloth. See Ward et al., page 258, lines 2-5, 14, and 25. Ward et al. further disclose the radicals can react absent the radical source, "polymerizations can be initiated either by

the simultaneous presence of monomer and cotton fabric in the plasma, or by direct contact between previously activated cotton and monomers." Ward et al. disclose the reaction between styrene, a functionalized olefin, and cellulose, and the product formed thereof. See Ward et al., page 271, lines 3, 4, 6, 7, and 18 and table 9, entry 3. Ward et al. further disclose that the stable radical has a half-life of about 1 day, "the singlet remains even after 24 h exposure to room atmosphere, showing that the radical is long-lived." See Ward et al., page 266, lines 6-9.

Demott discloses the preparation of cellulosic materials reacted with a functionalized olefin, vinyl phosphonate, using a free radical reaction. See Demott, column 1 lines 39-40, column 2 lines 53-59. Demott discloses the use of cellulosic material as "The invention is of particular use in the textile industry in that the vinylphosphonate additionally imparts permanent-press as well as fire-resistance to cellulosic fabrics and to fabric blends of cellulosic fibers and fibers of wool, polyester, rayon, nylon [a polyamide], or other like synthetic fibers. Such fabric blends are well known and widely used in the art." See Demott, column 2, lines 17-20.

It would have been obvious to one of ordinary skill in the art at the time of the invention to apply the teaching by Demott of fabric blends incorporating the functionalized cellulosic material to the functionalized cellulose in the form of fibers in cotton print cloth disclosed by Ward et al. As taught by Demott, "Such fabric blends are well known and widely used in the art."

Response to Argument: Applicant's argument, filed 21 Nov 2007, with respect to the above ground of rejection, has been fully considered and not found to be persuasive

to remove the rejection. Applicant argues that Ward et al. merely mentions the theoretical possibility of performing the process in two steps, but they admit that in practice the process was not preformed. This is contrary to the disclosure by Ward et al. that exploratory investigations were performed and met with limited success (Ward et al. page 271) as explained above. As explained above Ward et al. anticipates claims 1-5, 10, 11, and 13. Demott is relied upon to teach both "cellulosic fabrics and ... fabric blends of cellulosic fibers " (Demott, column 2, lines 17-20) in the place of the cellulose matrix of cotton cellulose in the form of fibers in cotton print cloth disclosed by Ward et al. (Ward et al., page 258, lines 2-5, 14, and 25.). Demott teaches "Such fabric blends are well known and widely used in the art." See Demott, column 2, lines 17-20.

Therefore Ward et al. in view of Demott renders claims 1 and 4-6 unpatentable.  
The rejection is deemed proper and made **FINAL**.

### ***Conclusion***

No claim is found to be allowable.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan S. Lau whose telephone number is 571-270-3531. The examiner can normally be reached on Monday - Thursday, 9 am - 4 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisors, Ardin Marschel can be reached on 571-272-0718 or Cecilia Tsang can be

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reached on 571-272-0562. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JSL

Shaojia Anna Jiang, Ph.D.  
Supervisory Patent Examiner  
Art Unit 1623

/Cecilia Tsang/  
Supervisory Patent Examiner, Art Unit 4173